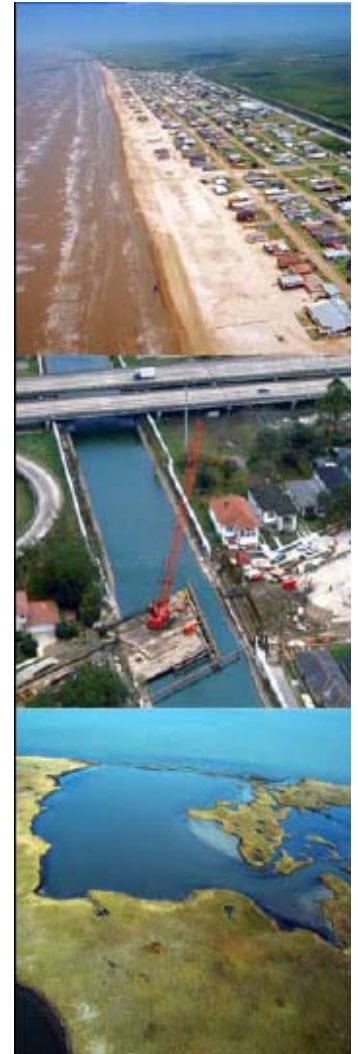


Louisiana Coastal Protection and Restoration (LACPR)

Nonstructural Plan Formulation and Evaluation

15 May 2007



One Team: Communicating, Collaborating, Consensus



Background

Section 73 of the 1974 Water Resources Development Act (WRDA) requires consideration of nonstructural alternatives in flood damage reduction studies.

LACPR Supplemental PGM, dtd 28 Aug 2006, states:

- “Integrate hurricane and storm damage reduction and coastal restoration and include ***non-structural measures***.”
- “Coordinate all measures closely with FEMA ... and utilize the Corps ***National Non-Structural Committee***.”



Characteristics of Nonstructural Measures

- Removes people/property from the threat rather than altering the nature of the threat
- Also can be used to adapt to the threat if evacuation is not feasible
- Flood-proofing/elevating are implemented on privately-owned land
- Require the voluntary cooperation of the homeowner or the condemnation authority of the Non-Federal sponsor



Nonstructural Measures

- Buyout/Permanent Evacuation
- Relocation/Moving Structures
- Elevation/Raising-in-Place
- Wet- and Dry-Flood Proofing
- Berms, floodwalls
- Flood Warning
- Changes in policies, practices





Raised Slab House, Dulac



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Berm Surrounding Home, Erath



One Team: Communicating, Collaborating, Consensus



Raising-in-Place, Gentilly



One Team: Communicating, Collaborating, Consensus



House Raised on Fill, Cameron Parish



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Advantages of Nonstructural Measures

- Scale is flexible--can be implemented incrementally
- Little time required to implement, compared with structural measures
- Benefits realized immediately upon implementation
- Complementary to other land use initiatives such as ecosystem restoration, recreational development, urban green space



Goals for Nonstructural Plan Formulation

- Primary goal:
Reduce risk to population and assets
- Risk can not be eliminated:
Manage risk to critical facilities and economic assets
Manage residual risk to population and assets



Functionality of Nonstructural Measures

- Stand alone risk reduction
- Combination with structural, providing
 - Interim risk reduction—pre-structural
 - Residual risk reduction—post-structural
 - This approach addresses issues of system
 - » Redundancy—multiple lines of defense
 - » Reliability—fail-safe



Gradient of Risk Reduction Capability of Nonstructural Measures

Most Reliable: Buyout/Permanent
evacuation

Less Reliable: Flood warning/temporary
evacuation (uncertain response)

Application of measures based on nature of
risk, consequences, locale, other factors



Levels of Protection

As per Supplemental PGM, target levels of protection are

- 100-year recurrence interval (1% annual chance)
- Katrina-like event: 400-year (0.25% annual chance)
- High Category 5 event: 1000-year (0.1% annual chance)



Formulation Criteria for Nonstructural Measures

- Flooding conditions: velocity
- Depth of inundation
- Structural integrity
- Other agency involvement/interest



Formulation Criteria for Nonstructural Measures—Flooding Conditions

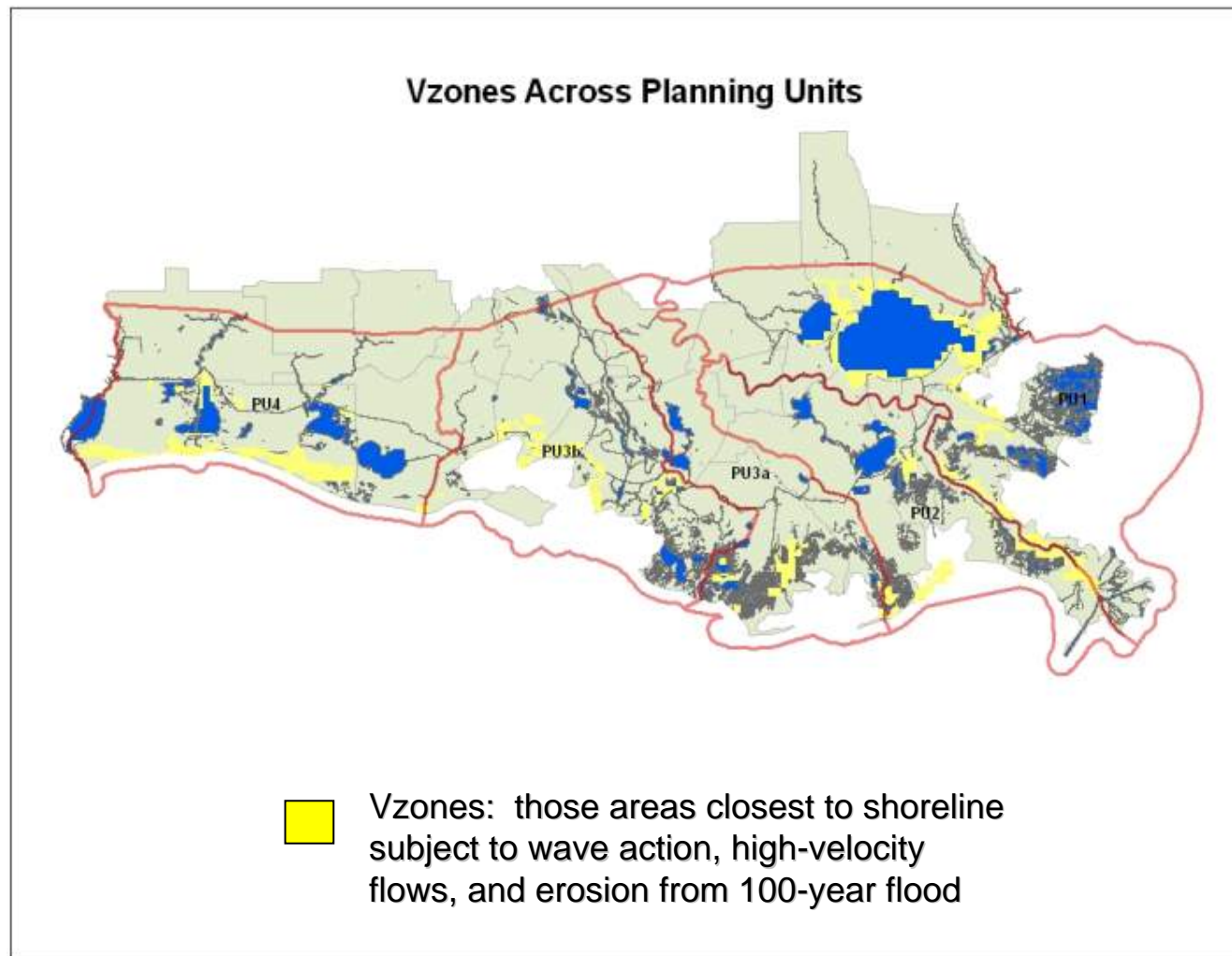
Areas of exposure to surge velocity:

Areas noted as high velocity (“V”) zones mapped by FEMA will be investigated for population and assets

Decision criterion: The only reliable nonstructural measure for reducing risk due to velocity surge is buyout/permanent evacuation.



Surge Velocity as Risk Indicator





Formulation Criteria for Nonstructural Measures—Depth of Inundation

Decision criterion:

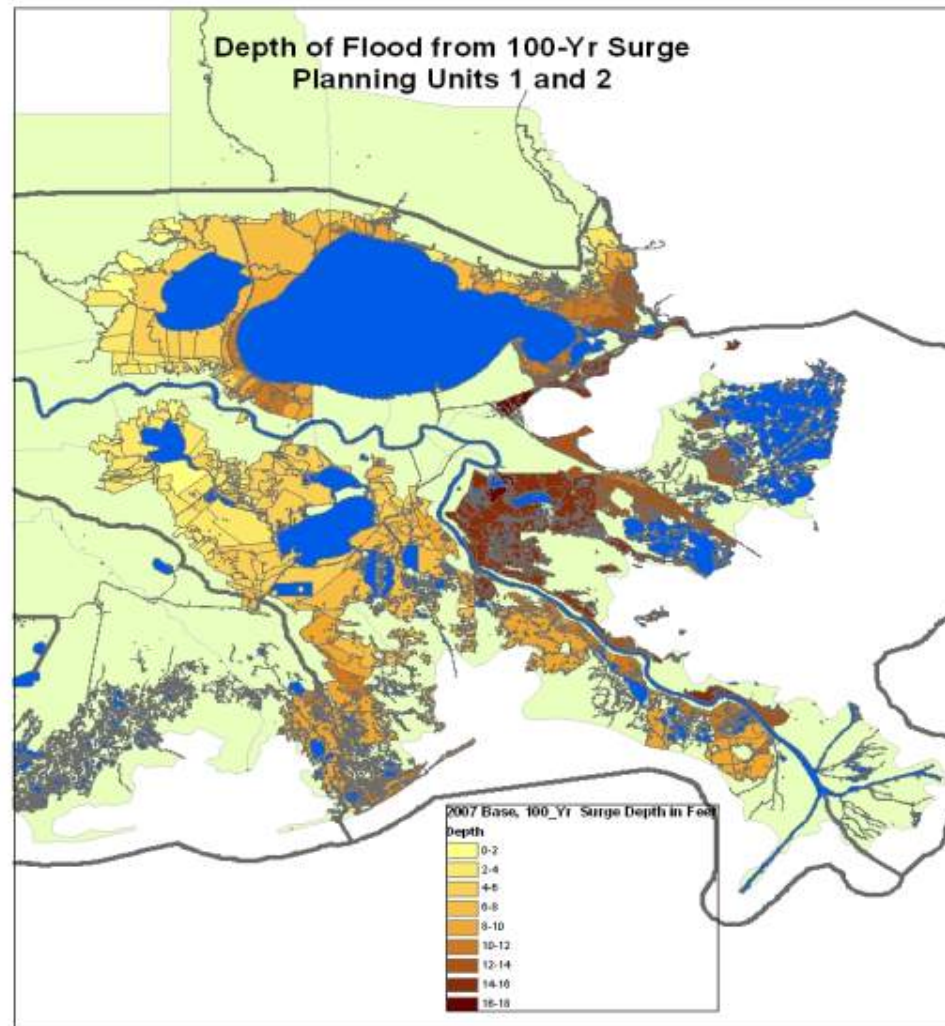
If inundation >13 -15 feet, buyout/permanent evacuation measures apply

If inundation ≤ 13 -15 feet, consider raising-in-place, other nonstructural measures

(Note FEMA publication 550 for raising-in-place for criterion decision)



Depth of Flooding as Risk Indicator





Formulation Criteria for Nonstructural Measures—Structural Integrity

Determine whether structures possess the structural integrity to be lifted or retrofitted for nonstructural measures



Formulation Criteria for Nonstructural Measures—Other Agency Involvement

Priority will be given to areas where the potential to collaborate with other agencies is high and nonstructural measures are compatible with other Federal, State, or local initiatives such as ecosystem restoration, FEMA acquisitions, or local initiatives for preserving communities or living cultures.



Formulation Criteria for Nonstructural Measures—Critical facilities/Economic Assets

Collaborate for compliance across agencies

Utilize State's Master Plan for identification of critical facilities/economic assets

Follow FEMA guidelines for 500-yr level of protection for facilities that cannot be moved out of harm's way

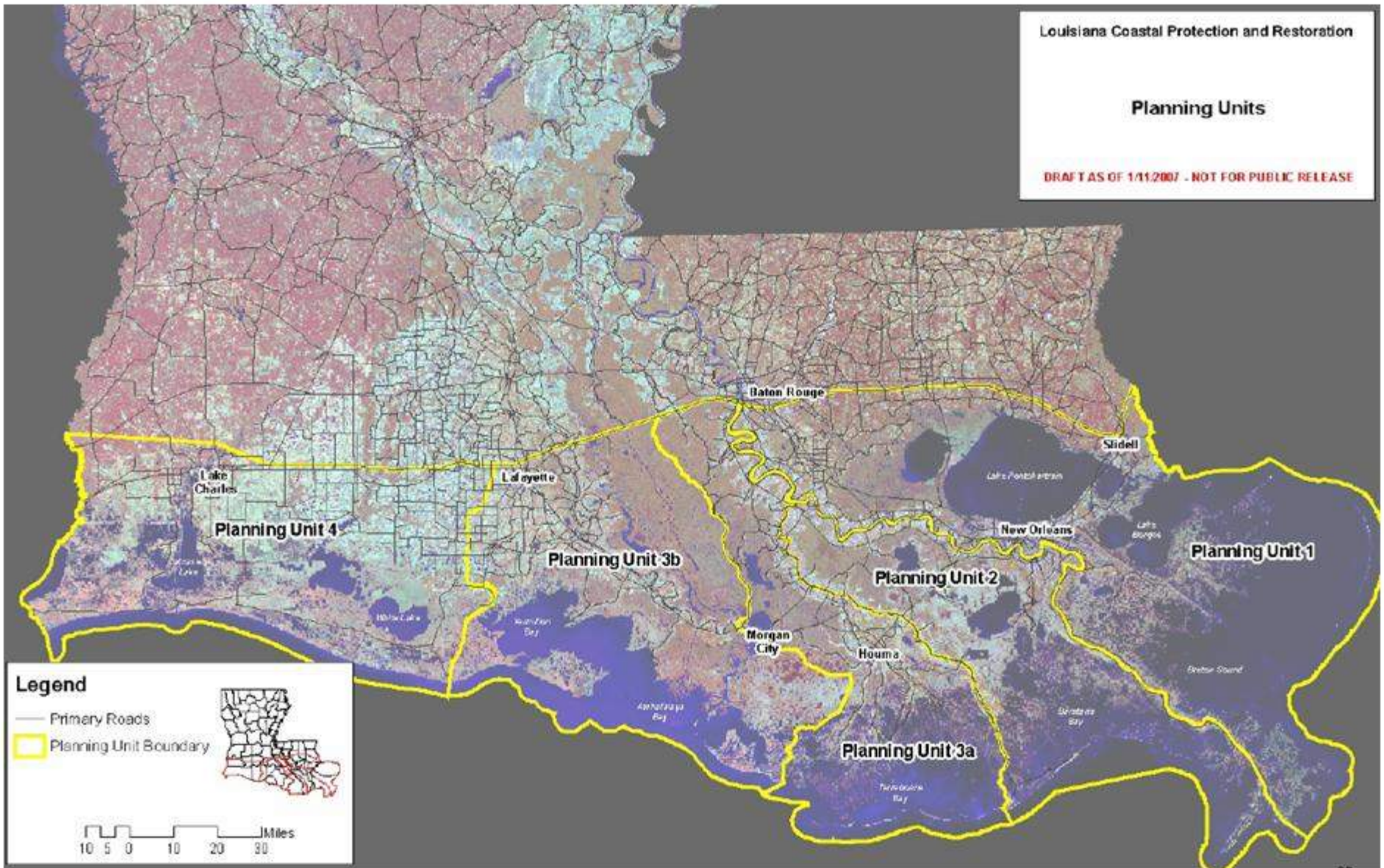


Two-fold Formulation Process

- Formulate plans based on decision criteria
 - Precision based on study scale, time element, data limitations
- Identify demonstration projects where nonstructural measures can be implemented in near term
 - Supports recovery efforts
 - Opportunity to collaborate with other agencies
 - Identifies impediments to implementation

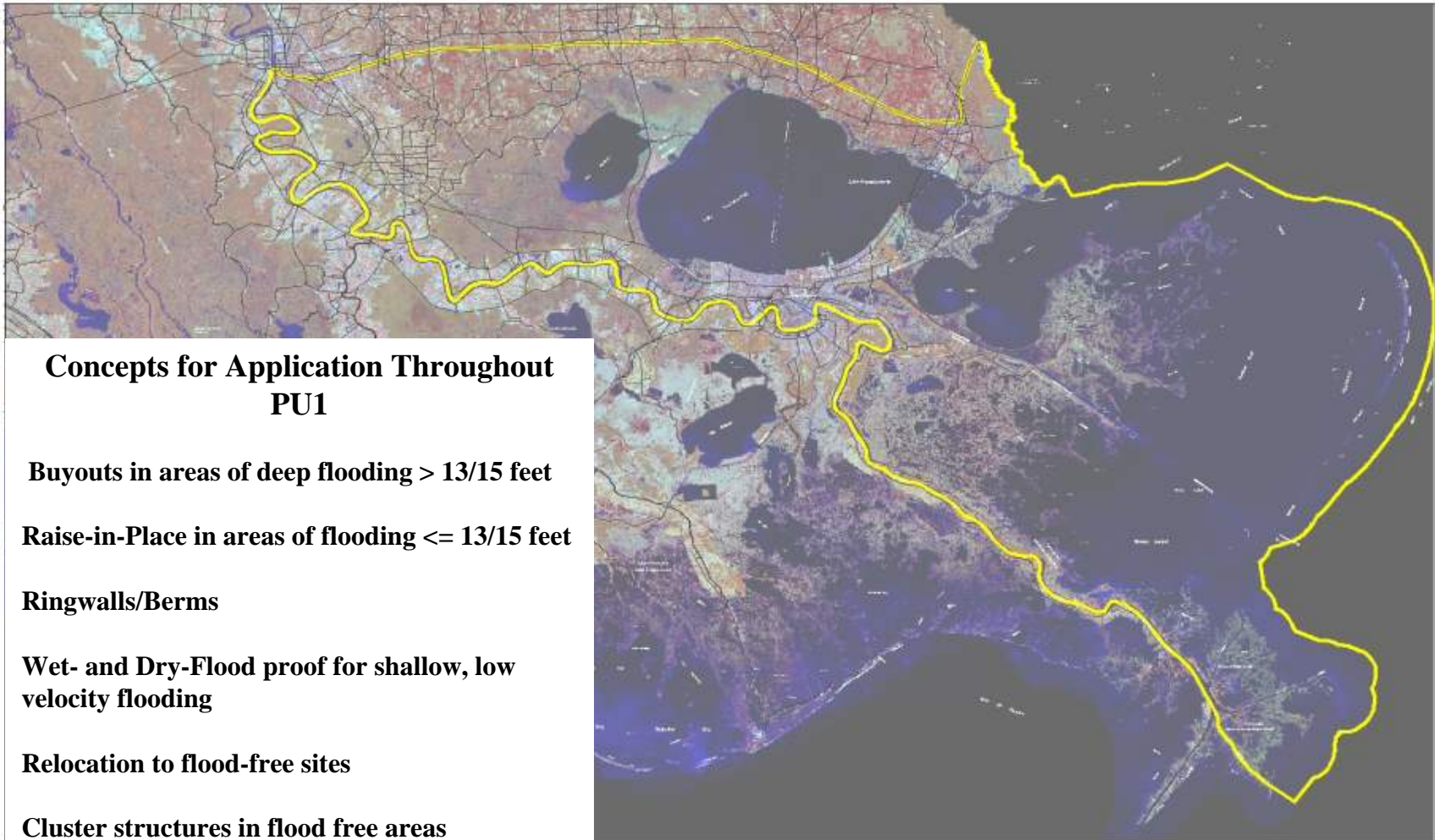
Planning Units

DRAFT AS OF 1/11/2007 - NOT FOR PUBLIC RELEASE



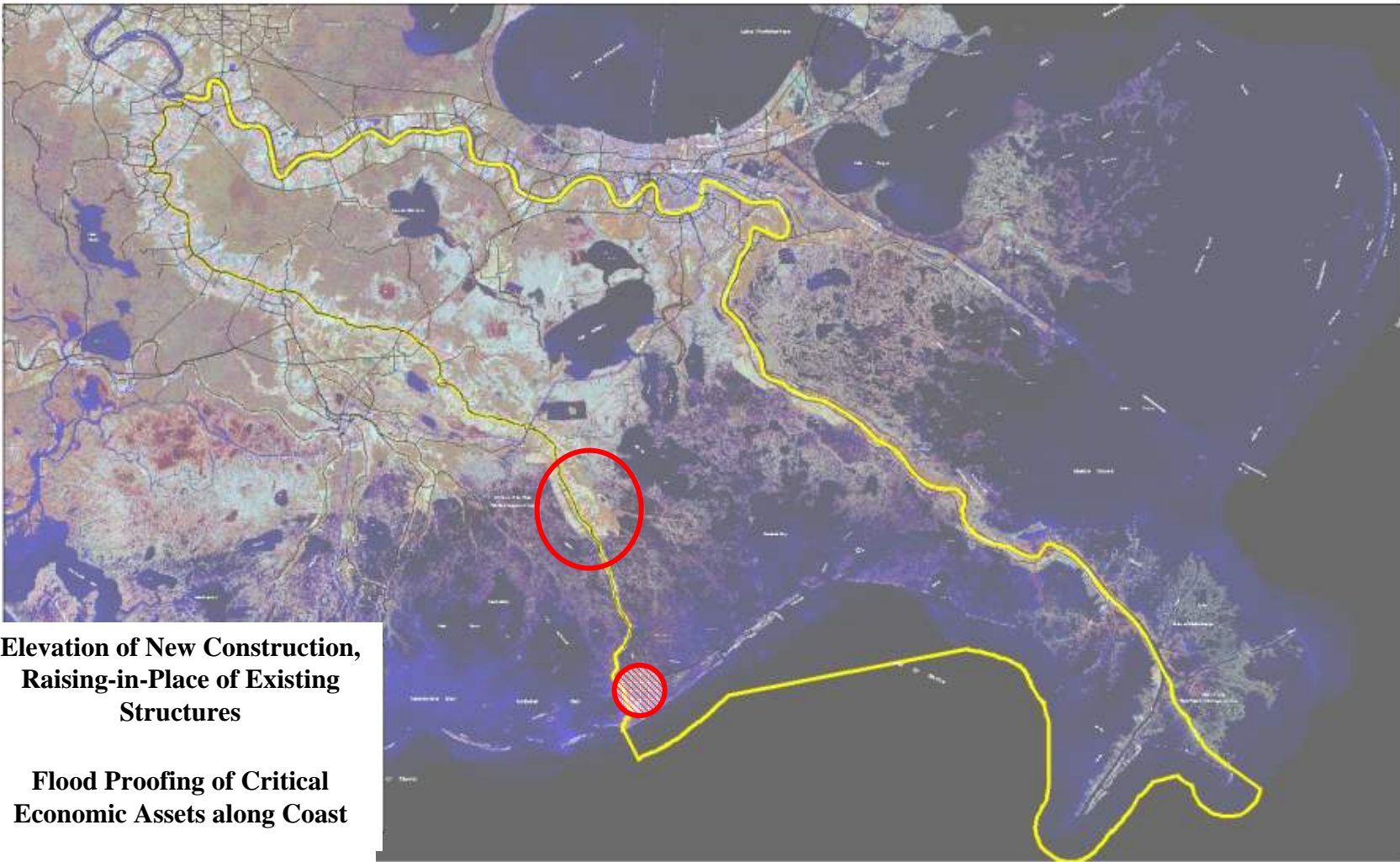


Planning Unit 1





Planning Unit 2



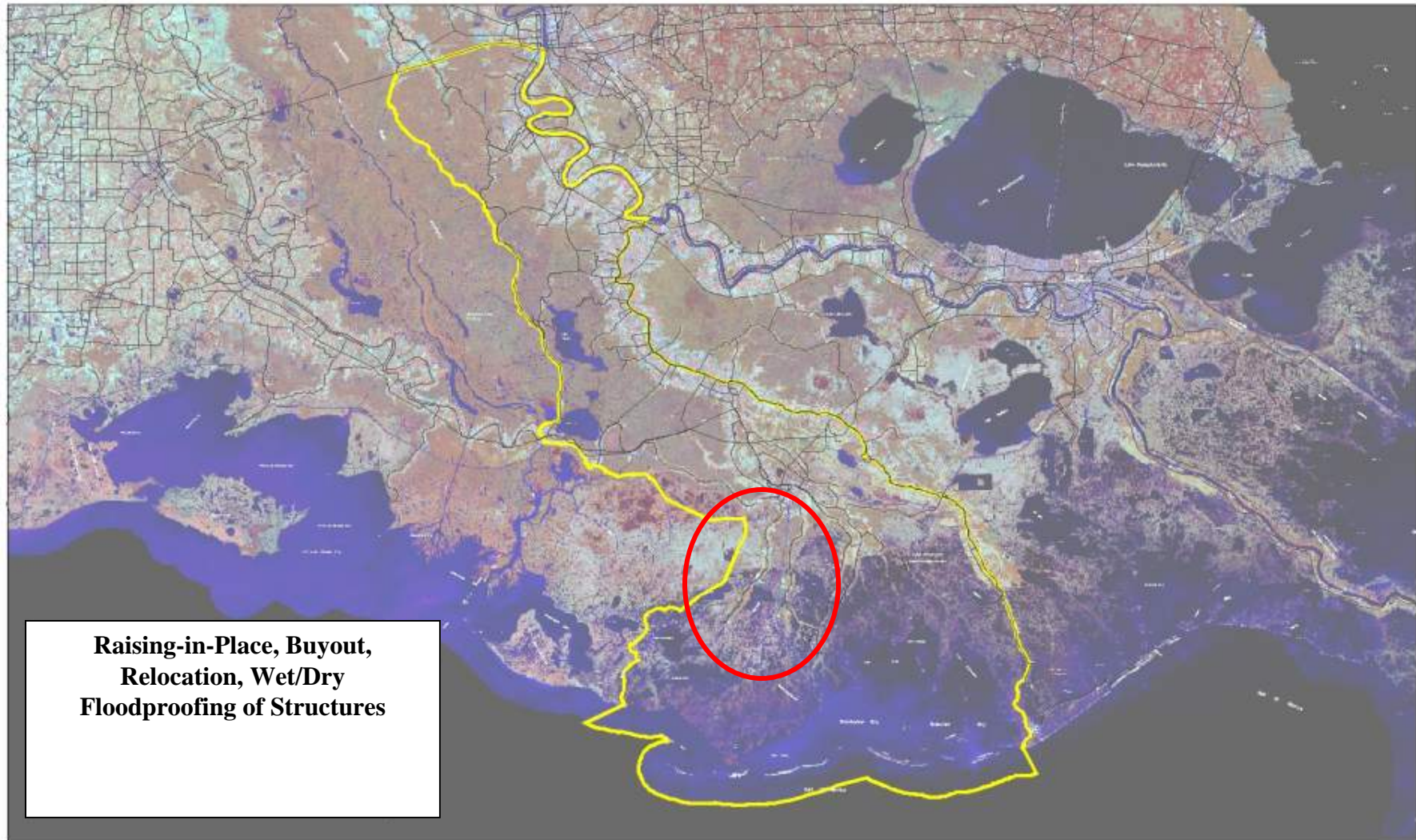
**Elevation of New Construction,
Raising-in-Place of Existing
Structures**

**Flood Proofing of Critical
Economic Assets along Coast**

One Team: Communicating, Collaborating, Consensus

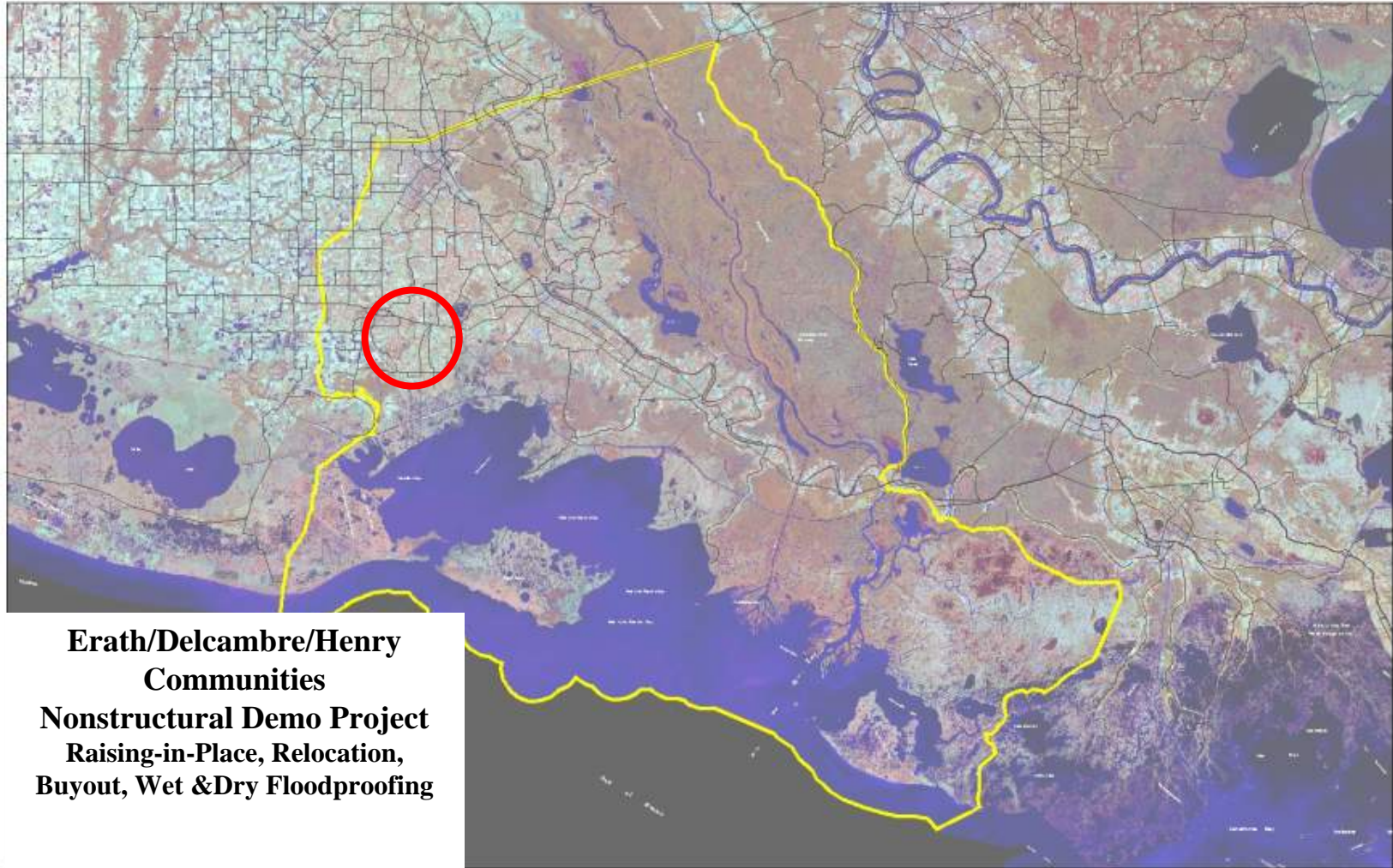


Planning Unit 3a





Planning Unit 3b

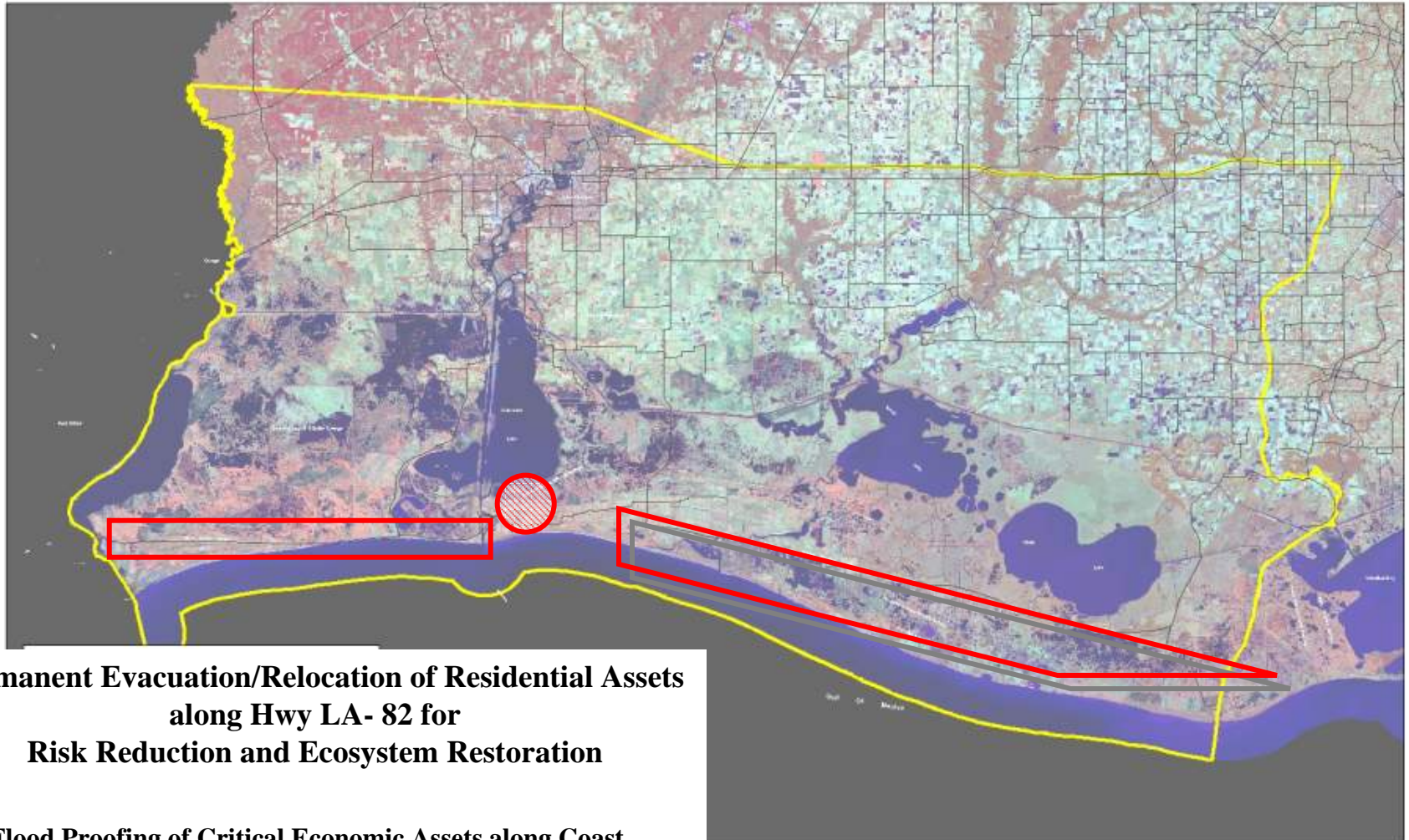


**Erath/Delcambre/Henry
Communities
Nonstructural Demo Project
Raising-in-Place, Relocation,
Buyout, Wet & Dry Floodproofing**

One Team: Communicating, Collaborating, Consensus



Planning Unit 4



**Permanent Evacuation/Relocation of Residential Assets
along Hwy LA- 82 for
Risk Reduction and Ecosystem Restoration**

Flood Proofing of Critical Economic Assets along Coast

One Team: Communicating, Collaborating, Consensus



Evaluation Methodology

- Basic unit of analysis same as with structural analysis: census block
- Data elements built on previous work for IPET
- One hydrologic condition, 2010
- Four scenarios
- Level of detail sufficient for programmatic authority



Evaluation of Nonstructural Measures

- Cost estimates
 - Huntington District support for nonstructural measures on private property
 - New Orleans District support for
 - Buyouts/permanent evacuation
 - Sect 219, WRDA 99 to develop economic costs for buyouts/permanent evacuation
 - PL 91-646 Relocation Assistance



Evaluation Strategy

- Reduce risk for least cost
- Identify increments of risk reduction and costs
- Identify residual risk



Implementation Strategy

Those areas that present near-term opportunities for reconstruction/redevelopment will be given highest priority for implementation.

Initially focus on those parishes that sustained heaviest damage from Hurricanes Katrina and Rita with regard to maximizing immediate returns from nonstructural measure implementation, i.e., where rebuilding is occurring.

Secondly, focus on those parishes that did not sustain heavy damage from Hurricanes Katrina and Rita for implementing nonstructural measures.



Evaluation Metrics

- Damages prevented to property improvements
- Reduced risk to population
 - Reliability of critical facilities

